Zero Retries issue 0216 2025-08-22

Zero Retries is an independent newsletter promoting technological innovation in and adjacent to Amateur Radio, and Amateur Radio as (literally) a license to experiment with and learn about radio technology. Radios are computers - with antennas! Now in its fifth year of publication, with 3100+ subscribers.

About Zero Retries

Steve Stroh N8GNJ, Editor

Email - editor@zeroretries.net

On the web: https://www.zeroretries.org/p/zero-retries-0216

Substack says “Too long for email”? **YES**

Subscribe now

In this issue:

Request To Send

- Paid Subscribers Update
- Substack Internal Links Aren’t Working
- LinHT Progresses
- Weekends Are For Amateur Radio!

Zero Retries Digital Conference 2025 Update - 8/22/2025

Three Brief Articles on LinHT

- First LinHT Tests
- LinHT – Open SDR Handheld for Radio Amateurs
- Demo LinHT M17 Decode

ZR > BEACON

- ARRL Technical Awards
- PACKRAT - Intro and Five Part Series, and hz.tools - Tutorial on Software Defined Radio by K3XEC
- patty AX.25 stack (for POSIX-like OS)
- July / August 2025 ARDC News
- IPv6 /48 Subnets for Radio Amateurs
- http://amprv6.org
- JNOS 2.0q
- SF-HAB High-Altitude Balloon Launch #5
- Turn Any Android Device Into A Full VHF Radio - KV4P Version 2 - NEW!
- AREDN Development Plans 2025
- MMDVM.com 2025-08 Update
- Does Amateur Radio Need a DEFCON?
- Open Letter from AMSAT-SM Regarding Development of a Full Duplex Handheld
- AllStarLink Appeal For Donations

Comments Summary From Previous Issue

Zero Retries Boilerplate

Permission for Reuse of Zero Retries Content

Keywords for this Issue

Footnotes for this Issue

Comments for This Issue (redirect to Comments page)

Request To Send

Commentary by Editor Steve Stroh N8GNJ

Paid Subscribers Update

My thanks to **Rick Prelinger W6XBE** for *renewing* as a **Founding Member Subscriber 0011** to Zero Retries this past week!

My thanks to **Prefers to Remain Anonymous 47** for upgrading from an **Annual Paid Subscriber** to **Founding Member Subscriber 0018** to Zero Retries this past week!

Founding Member Subscribers are listed in every issue of Zero Retries!

My thanks to **Don Coker KM6TRZ** for *renewing* as an **Annual Paid Subscriber** to Zero Retries this past week - for a 3rd year!

My thanks to **Prefers to Remain Anonymous 46** for *renewing* as an **Annual Paid Subscriber** to Zero Retries this past week!

My thanks to **Prefers to Remain Anonymous 92** for *upgrading* from a free subscriber to Zero Retries to an **Annual Paid Subscriber** this past week!

My thanks to **Prefers to Remain Anonymous 94** for *upgrading* from a free subscriber to Zero Retries to an **Annual Paid Subscriber** this past week! PRTA 94 included this nice message:

> I'm not technically savvy, but I support open source technology. I find your newsletters fascinating, learning what's under development. I'm familiar with DMR, and I aspire to learn to use my new CS700-M17 GPS. As an ARES Winlink user, I look forward to the open source substitute for VARA that you report is in development.

PRTA 94 is referring to Mercury, which is the subject of an upcoming story in Zero Retries… if all these pesky 😄 exiting new developments would quit popping up week after week.

Financial support from Zero Retries readers is a significant vote of support for the continued publication of Zero Retries.

Substack Internal Links Aren't Working

I was told that the internal hyperlinks in the Table of Contents of the last several issues of Zero Retries aren't working - they redirect to the URL of the issue. I haven't had time to troubleshoot this issue, thus I won't feature a hyperlinked Table of Contents until I can resolve that issue with Substack.

LinHT Progresses

The LinHT project, being developed as a project within the larger M17 Project, is some really impressive technological innovation in Amateur Radio. LinHT is really disruptive technology being developed within Amateur Radio that isn't being attempted anywhere else. My wife Tina is fond of stating "You never know where the next great idea is going to come from" and LinHT is a great example of that. LinHT is a win / win / win scenario:

- Amateur Radio will finally have the "universal radio" that has been needed for more than a decade since Amateur Radio VHF / UHF began fragmenting into non-interoperable digital voice and data modes.
- Amateur Radio and GNU Radio users will finally have a practical, and (probably, soon enough) inexpensive platform to develop and use new types of radio technology, developed in software - write it, *run* it, ***use*** it.
- That LinHT is being developed as an Open Source proof of concept will enable commercial manufacturers to create a VHF / UHF Software Defined Radio. There will be ample opportunities to differentiate different vendor's products - higher power (can't come soon enough), mobile radio form factor (and higher power), multiple bands (222-225 MHz hopefully soon), ease of use / better user interfaces, etc.

As I said in a previous issue of Zero Retries, I think LinHT is just going to blow by the major Amateur Radio manufacturers because they just can't grasp[1] the pent up demand for a VHF / UHF Software Defined Radio within Amateur Radio. Whatever commercial vendor delivers the first usable LinHT (including reasonable power levels - probably 5 watts) is going to *sell a whole lot of them*. The market for LinHT isn't just Amateur Radio, it's *vastly* larger - university students, GNU Radio experimenters, etc. For example, I will be giving a Lightning Talk on the LinHT at GRCon 2025 to explain the LinHT to the GRCon attendees.

I think we'll quickly see variants of LinHT developed as, for example, a "travel router" form factor[2] with power and communications via USB-C, no local display or controls. designed for use with laptops to enable VHF / UHF communications.

And, while the device isn't quite sufficient (we're going to need new radio modes to take full advantage of these capabilities)… LinHT is the kind of 21st century technology that is relevant to the NewTechHams that I've been writing about in Zero Retries, and I believe it will be interesting enough to attract techies to get their Amateur Radio license to be able to use it.

Consider engineering students - It's fun and instructional to experiment with GNU Radio and maybe run your GNU Radio experiments on a very low power Software Defined Transceiver such as the ADALM-PLUTO which is (as far as I'm aware) the primary unit for Electrical Engineering students for

experimentation with radio.

But how much *more* fun *and instructional* would it be run your GNU Radio experiments on a LinHT that you can carry around, self contained, running your own unique radio system on campus, with your friends?

Lastly, I find it humorous that two projects underway - GT-DV and Opulent Voice, both of which the principals of those projects have “dissed” M17… may well see their respective projects *most widely used in a LinHT*.

Weekends Are For Amateur Radio!

Have a great weekend, all of you co-conspirators in Zero Retries Interesting Amateur Radio activities! We will be entertaining a dear friend as a guest, and more, more, more writing in time for ZRDC 2025 to finish my submitted paper and my keynote presentation (Tina and ZRDC Proceedings Coordinator Don Rotolo N2IRZ are fearsome taskmasters). And, perhaps some fun time in N8GNJ / Zero Retries Labs.

Steve N8GNJ

Leave a comment

Share

Zero Retries Digital Conference 2025 Update - 8/22/2025

By Tina Stroh KD7WSF

This is the fifth in a series of weekly updates leading up to Zero Retries Digital Conference 2025. ZRDC 2025 occurs in three weeks!

Breaking News!!!

ONE DAY PASS FOR ZERO RETRIES ATTENDEES AT GRCon 2025!

In our weekly conference call with the folks from GNU Radio, they mentioned they had received some feedback regarding the ticket price for their one day pass. Since Steve and I are the local hosts for GRCon 2025, they graciously offered a one day pass for Zero Retries attendees to GRCon 2025 at a significant savings. A normal one day pass was $350.00 and now it's discounted to $125.00 All inclusive including meals. However, you must be registered for the Zero Retries Digital Conference (ZRDC) to receive the discount. This is an extremely generous offer and I hope many will take advantage of it. GRCon 2025 starts 9/8/2025 through 9/12/2025.

One Day Pass
We are offering a one day pass for both regular and students. If you are attending for more than one day, please purchase a regular ticket.
One Day Pass
Meant for those only attending one day.
$125.

(Image from GRCon Registration site)

Discount code: ZERORETRIESDISCOUNT

https://tickets.gnuradio.org/grcon25/redeem?voucher=ZERORETRIESDISCOUNT

REGISTRATION

As I mentioned last week, I have added a new ZRDC tickets for clubs to purchase. There are two versions of the club ticket; one for virtual attendance on the day of the conference and one for the early release of the video. It is a one ticket price, regardless of how many are participating.

If you are planning on attending in person, **please register by September 5th** as I will need to give the venue a head count for meals. Although we can accommodate the day of registrations, IT WILL NOT include meals and we don't want to turn anyone away. The admission cost also increases. So, please register ASAP.

Conference: Registration for ZRDC 2025

Links

Zero Retries Digital Conference 2025

Zero Retries Newsletter

Please check the Conference page on the Zero Retries Webpage regularly for up to the minute news.

In closing for this week, we would like to thank our sponsors for their gracious donations:

ARDC

ARRL

CentyLab

Connect Systems

GigaParts

HydraSDR

Leave a comment

Share

Three Brief Articles on LinHT

Compiled by Steve Stroh N8GNJ

As I've been saying, there's a lot going on with LinHT!

First LinHT Tests

Wojciech Kaczmarski SP5WWP on the M17 Project website:

> The future is here: LinHT booted up successfully for the first time. We believe that *Software Defined Transceivers* will be the next big trend in amateur radio.

LinHT is the most important hardware project in Amateur Radio today.
Bruce Perens, K6BP
https://perens.com/2025/08/12/whats-wrong-with-ardc/

The test device has no RF amplifier (although we will include GRF5604 RF amplifier in the next revision, see this). The output power of this test setup is around 5dBm. Frequency range: 420-450MHz (UHF).

While some doubted that such a design is even viable, we continued our work tirelessly. Big shout out to Vlastimil OK5VAS and Andreas OE3ANC. The project would not be possible without your help, guys.

Quick, preliminary LinHT preview.

The device is open source hardware. The PCB design is available here.

Total cost for a prototype run:
– $490 for PCB+assembly at PCBWay (5 pcs.)
– Retevis C62 (donor)
– $469 for SoM, 5pcs.

and…

LinHT – Open SDR Handheld for Radio Amateurs

Vlastimil Slinták OK5VAS on his blog:

> **What is LinHT?**
>
> LinHT (Linux Handheld Transceiver) is our attempt to take the flexibility of SDR and bring it into a form factor radio amateurs actually use every day: a handheld. Instead of another black-box HT with proprietary firmware, LinHT runs a **full Linux system on an NXP i.MX93 SoM**, with **GNU Radio** as the DSP engine.
>
> - The RF front-end is based on the **Semtech SX1255** – a complete IQ modulator/demodulator, which makes it possible to support "all modes" in software.
> - On the software side, the image is built with **Yocto**, and already includes Python, GNU Radio, development/debug tools, USB networking (Ethernet with DHCP and SSH), and hardware support (GPIOs, display, codec, SX1255).
> - Images are already available for download at m17project.org/linht/experimental.
>
> In short: it's a small Linux computer with a radio front-end – and it fits into the enclosure of an off-the-shelf handheld.
>
> **The team**
>
> Right now, the LinHT core team is just three people:
>
> - **Wojciech, SP5WWP** – software and hardware design, testing, first prototypes.
> - **Andreas, OE3ANC** – software and system integration (Linux image, Yocto, drivers).
> - **Myself, Vlastimil, OK5VAS** – PCB design.
>
> It's a small group, so it means we cannot add support for every feature immediately, but we're making progress. We just received the first prototype PCBs, and Wojciech has already started bringing them up.
>
> **Current status**

First working LinHT prototype. Photo by SP5WWP.

The Linux image is booting, networking works, and most of the hardware is already supported. GNU Radio flowgraphs can run directly on the handheld, which opens the door to a huge range of experiments.

On the RF side, the first prototypes are at the “does it even turn on” stage, but the design already covers the basics: display, codec, SX1255.

The next step is **power amplification**. The current board runs at milliwatt levels, but we’re already working on adding a PA for around **3–5 W output**. That’s where my LinHT-rf-amp project comes in: a proof-of-concept RF amplifier board based on the Guerrilla RF GRF5604. Once we’ve characterized it, the PA will be integrated into the handheld.

Why should hams care?

Because **it’s open**.

Every major HT on the market today is a locked-down device. You get the features the manufacturer decided you should have, and that’s it. With LinHT, we finally have a path to a **fully open handheld** where you can:

- run your own software and protocols,

- experiment with SDR modes beyond FM/DMR,
- learn and tinker with GNU Radio on actual RF hardware,
- contribute to a platform that is community-driven instead of vendor-driven.

> Bruce Perens, one of the early open-source pioneers, recently mentioned LinHT in his blog, recognizing it as an example of the kind of important innovation amateur radio needs. In my opinion, that alone is a good sign we're onto something.
>
> **Why these design choices?**
>
> A few people have already asked why we picked Guerrilla RF's GRF5604 as the PA, why the first prototype is "only" UHF, and whether the i.MX93 SoM can actually handle heavy DSP tasks like vocoders. These are all fair questions, so let's unpack them.
>
> **On the PA:** We went with the GRF5604 because it's compact, efficient, and hits the power target we're aiming for – **around 5 W in a handheld**. Yes, it's designed for a 3-5.25 V supply, but that's not a problem for us. The handheld form factor means a single Li-Ion pack or a 5 V power supply is a good fit. Guerrilla RF might not be as well-known in the ham community as, say, CML Micro, but this IC has all the necessary parameters and documentation we need. For our first step, the balance of availability, size, and performance made sense.
>
> **On UHF first:** The SX1255 transceiver chip we're using **covers 400-510 MHz**, which neatly spans the 430-440 MHz ham allocation in Europe (and 420-450 MHz in the US). That makes UHF the logical starting point: it's the "universal" handheld band. Could we also do VHF or 900 MHz? Sure, but that would mean different RFICs, and more filters. For this first iteration, **it's better to walk before we run**. Once the hardware, software, and mechanics are proven at UHF, we can revisit multiband.
>
> **On DSP and vocoders:** The SoM (an MCM-iMX93) is more than capable for digital voice. M17's Codec2 vocoder runs fine. Wojciech and Andreas also tested TETRA reception, and performance was good. More demanding vocoders like IMBE/AMBE (used in P25, DMR, etc.) should be within reach of the dual Cortex-A55 cores and the M33 coprocessor. We haven't even touched the NPU yet.
>
> **So the short version is:** the choices we made aren't the final word, they're just the **most practical path for a first prototype**. UHF-only, 5 W PA, Codec2 and M17 working – enough to prove the concept.

and…

Demo LinHT M17 Decode

Wojciech Kaczmarski SP5WWP on the M17 Project website:

> I used my USRP B210 to transmit a reference M17 RF signal with the recently updated gr-m17. Here's how LinHT decoded it. There is no signal parameter or RF front-end config display yet (receive/transmit frequencies, SRC and DST callsigns, etc.). For now, all of that data is available through SSH only.

This post has a couple of very short videos with audio. Considering the stage of development and that this is being done on an *embedded* Software Defined Radio in a portable device… not bad!

The progress on LinHT is pretty amazing. Goodspeed LinHT development team!

Opulent Voice End-to-End Working

Michelle Thompson W5NYV on the Open Research Institute website:

> At DEFCON in RF Village, we had a place to demonstrate work from ORI. We showed off open source synthetic aperture radar with coffee cans and GNU Radio and a PLUTO, and had space to show our "FT8 performance for keyboard chat" RFBitBanger QRP HF kit. We had room for the regulatory work for ITAR/EAR/219 MHz. And, very importantly – we had enough space to show major components of our UHF and up comms Opulent Voice system for amateur terrestrial and satellite fully up and running. At DEFCON, we had the human-radio interface and the modem as separate fully functional demonstrations.
>
> Today, these two components have been combined and are working end-to-end. It's coughing and sputtering, but it's a solid first light. This means that microphone/keyboard/data processing from user input to waveforms over the air are happening.
>
> The design goals for Opulent Voice project are to deliver very good voice quality in a modern way. AMBE/CODEC2 honestly sound terrible. Amateur radio deserves better audio quality. Therefore, we baseline Opus 16 kbps. It sounds great. Want more? there's a path to 32 kbps.
>
> We were very tired of a separate broken packet mode for data in ham digital voice product after ham digital voice product. Opulent Voice has keyboard chat and data in a single prioritized stream. No separate clunky packet mode. No 1980s architecture. It just works. In your browser. Or, at a command line interface. Chat only with transcriptions of all the audio received? With a microphone all in your ears and you never have to look at a screen? Your choice.

I had not been paying attention to the latest work on Opulent Voice. It took some careful reading:

> … to waveforms over the air are happening.

and a note from a Zero Retries reader to understand that Opulent Voice is *now a radio mode, as in can be transmitted over the air*.

In a link in the next item:

> It's easy to try out with a custom firmware build for the PLUTO SDR. Directions on how to install this implementation can be found at https://github.com/OpenResearchInstitute/pluto_msk
>
> Custom hardware is in development right now, with production no earlier than late 2025

That's the development I had been waiting for with Opulent Voice - being able to try it via RF. Apparently now with an Analog Devices ADALM PLUTO, and perhaps by the end of 2025, dedicated radio hardware. Perhaps it's time for N8GNJ / Zero Retries Labs to invest in a second ADALM-PLUTO to try out Opulent Voice.

Or perhaps, soon, Opulent Voice will be just another GNU Radio flowgraph that can be loaded onto a LinHT portable Software Defined Radio.

Leave a comment

Share

ZR > BEACON

By Steve Stroh N8GNJ

Short mentions of Zero Retries Interesting items.

ARRL Technical Awards

John Ross KD8IDJ in the ARRL Letter for 2025-08-21:

> The ARRL Technical Innovation Award is granted annually to individuals who are licensed radio amateurs with accomplishments and contributions which are of the most exemplary nature within the framework of technical research, development, and application of new ideas and future systems in the context of amateur radio activities. The Board bestowed the 2025 ARRL Technical Innovation Award on Matthew Wishek, NBØX, for his work on development of Opulent Voice Minimum Shift Keying transceiver implementation, and "modem module" architecture.
>
> The ARRL Technical Service Award is given annually to individuals who are licensed radio amateurs whose service to the amateur community and/or society at large is of the most exemplary nature within the framework of amateur radio technical activities. The 2025 award was issued to Bill Meara, N2CQR, and Dean Souleles, KK4DAS, who have developed and facilitated the "SolderSmoke Direct Conversion Receiver Challenge" education project, which has enabled high school students and many amateur radio operators to construct a working HF receiver.

I don't care for the perception of "only one significant technical development" each year nature of the ARRL Technical Awards, but at least ARRL is doing some formal recognition of technological innovation in Amateur Radio.

PACKRAT - Intro and Five Part Series, and hz.tools - Tutorial on Software Defined Radio by K3XEC

With all the recent mentions of Software Defined Radio here in Zero Retries, it was opportune that Zero Retries reader Justin Overfelt AB3E reminded me about the work of Paul Tagliamonte K3XEC who AB3E describes as … *exudes NewTechHam*. (I agree!)

I first mentioned K3XEC's work on PACKRAT in **Zero Retries 0024** - Intro to PACKRAT Tutorial Series:

> I've only made time to casually browse this series, but it really does look understandable for a typical techie. Something like this has been needed for a long time - how you go from software defined radio to data modulation / demodulation. With some focused study, I think even I could get this. Kudos K3XEC!

I don't think I made it clear then that K3XEC's PACKRAT series is complete:

- 2021-12-02 ※ Intro to PACKRAT (Part 0/5) 🐀
- 2021-12-02 ※ Processing IQ data formats (Part 1/5) 🐀
- 2021-12-03 ※ Transmitting BPSK symbols (Part 2/5) 🐀
- 2021-12-04 ※ Receiving BPSK symbols (Part 3/5) 🐀
- 2021-12-05 ※ Framing data (Part 4/5) 🐀
- 2021-12-06 ※ Proxying Ethernet Frames to PACKRAT (Part 5/5) 🐀

I also mentioned additional work by K3XEC in **Zero Retries 0089** - hz.tools - Radio Technology From a Software Perspective:

> … K3XEC has been busy fleshing out his vision for a well-documented, understandable "single [person] perspective" Software Defined Radio protocol stack. hz.tools is a teaching tool, and as with his PACKRAT Tutorial Series, K3XEC is "paying it forward" by helping to make Software Defined Radio technology more understandable.

Recommended!

patty AX.25 stack (for POSIX-like OS)

Alex Maheu KZ3ROX:

> patty (packet TTY multiplexer) is a portable implementation of the AX.25 2.2 standard, able to run in userland on many POSIX-like operating systems. The software uses the KISS TNC protocol to communicate with hardware.

Features

- Full support for AX.25 2.2 stateful connections
- BSD sockets-like API for listening for, accepting, establishing, and creating connections
- Separate BSD sockets-like API for sending/receiving Unnumbered Information (UI) datagrams
- Supports one separate program per SSID (up to 16) to accept inbound connections
- Supports thousands of concurrent inbound and outbound stateful connections
- Able to multiplex a single KISS TNC to multiple software endpoints via BSD pseudoterminals
- Allows APRS-IS connections to be used by software speaking the KISS TNC protocol

Example Use Cases

- Use off-the-shelf BBS software without modification
- Allow logins to a Unix shell
- Use Xastir with APRS-IS
- Create an APRS IGate

patty is another interesting discovery thanks to Justin Overfelt AB3E who noted:

> patty is a standalone userspace AX.25 implementation. Would be very neat to use for a variety of use cases where you might not want to trot out Direwolf.

Depending on who I talk to, the "kernel" AX.25 drivers in Linux / *NIXs are:

- Broken, or
- Deprecated, or
- Works fine now.

I can certainly see the utility of patty running in user land of *NIX rather than the kernel.

July / August 2025 ARDC News

Good roundup of ARDC's activities of late - they're busy folks!

One of the things that leaped out at me from this ARDC newsletter is that ARDC has a presence at *a number* of conferences and gatherings that *aren't* Amateur Radio, such as:

- Open Sauce Live
- FOSSY 2025
- HOPE 16
- GRCon25
- Maker Faire Bay Area 2025

That is what exactly Amateur Radio needs to be doing - reaching out to techies, makers, Open Source advocates, information technology, software engineers, engineering students, etc. (And promoting Amateur Radio activities, projects, systems, etc. that are relevant to the attendees at those events.)

While ARDC didn't mention a presence at DEF CON 33, there was definitely a significant Amateur Radio presence there, including the cool stuff that ORI and AREDN are doing.

I look forward to chatting with the ARDC attendees / speakers at GRCon 2025 and ZRDC 2025 in a few weeks.

Kudos ARDC!

IPv6 /48 Subnets for Radio Amateurs

Răzvan Zeceș YO6RZV on the 44net email list:

> As part of supporting the amateur radio community, I'd like to share some of my IPv6 resources.
>
> Since IPv6 space is practically endless and I'll never use it all myself 😅, I'd be happy to provide one free /48 IPv6 subnet to each fellow radio amateur in the ARDC community who wants to test, play, and explore IPv6.
>
> Each /48 comes with RPKI and a registered ROA in RIPE, so you can easily announce it in BGP if you'd like.

> If you need a larger subnet size, no problem — just let me know and we can discuss an allocation that fits your needs.
>
> Let's support the global transition from IPv4 to IPv6 together, especially now with the worldwide IPv4 shortage.
>
> If you're interested, drop me a message on email and I'll get you set up.
>
> Let's put these addresses to good use instead of leaving them idle!

Kudos to YO6RZV for this generous offer to help bootstrap Amateur Radio IPv6 activity!

http://amprv6.org

Related to the above, likely complementary. Seen in passing when checking out JNOS 2.0q - see below.

> **Amateur Packet Radio and IPV6**
>
> Just another way to perhaps consolidate amateur radio sites in IPV6 land ?
> * it's just a domain name, nothing more, but still ...
>
> telnet ve4klm.amprv6.org
>
> * yes, believe it or not, JNOS 2.0 has an IPV6 stack (for over a year now) ...
>
> Contact me if you want a subdomain - you must be IPV6 connected.

JNOS 2.0q

Maiko Langelaar VE4KLM mentioned this on the NOS-BBS email list.

> JNOS 2.0q is now out, check rsync repo, haven't updated official.txt yet
>
> In early 2023, I added an IPV6 stack to JNOS 2.0 and Michael Ford, WZ0C, has contributed significant enhancements to both the VARA and APRS code, while I simultaneously added support for multiple interfaces to the latter. Then came multiple heard groups per interface, to keep heard lists pristine on frequency or band changes, and more.
>
> Check out my VARA research page, there are older demonstration videos of JNOS forwarding with a Winlink Express client, an IP bridge between two JNOS systems, and an FTP session over IP between two JNOS systems. These were concept projects I did, with some naivety, in 2021 and 2022, but still noteworthy perhaps?

I couldn't quite parse out what was new, updated, or bug fixed with JNOS 2.0*q*, but there must have been something significant to justify a new release of JNOS.

SF-HAB High-Altitude Balloon Launch #5

The link above is recommended reading if you're at all curious about Amateur Radio balloon launches. It's easily equivalent to a long article in an Amateur Radio magazine.

The link is from an email by Martin Rothfield W6MRR that was a really intriguing, Zero Retries Interesting idea:

> One payload Item was the APRS over LoRa. Despite having just a few receiving stations it worked really well.
>
> Our last launch was to include a Meshtastic to Meshtasic link between balloons. Each balloon can have up to a 400 mi range circle. We also fly U/V crossband repeaters to coordinate the chase.
>
> To me, this has huge potential for EmComm. Here in California, the big EmComm threats are wildfire and earthquake. My belief is that repeaters would go down in either. Repeater sites frequently have a limited fuel supply that could be hard to replenish. Having the supplies of balloons and radio payloads on hand at EOC's would allow time release of HAB crossband/data repeaters.

Balloon to ballon, or just balloon-based repeaters (preferably digital / data, from my personal perspective)! *That would be really cool*, and conceptually as simple as putting up an inexpensive portable radio that can do cross-band repeating. What a cool idea!

Turn Any Android Device Into A Full VHF Radio - KV4P Version 2 - NEW!

Matthew Miller M0DQW on his Tech Minds YouTube channel:

In this video we take a look at the new Version 2 of the fabulous KV4P Android controlled VHF Transceiver. This now comes as a FULLY built kit, ready to be used plug and play style!

Technological innovation in Amateur Radio is coming fast and furious in Summer 2025!

AREDN Development Plans 2025

A heads up on AREDN software development plans

AREDN®, as we've come to know it, is 11 years old. In that time it has come a long way, supporting a wide variety of devices, a host of radio bands, and has been deployed across the world. The UI has evolved, tunnels have been added, bandwidth and throughput have increased, and more features and services can be supported. The one constant in all this has been how AREDN® manages the network, using a protocol called Optimized Link State Routing - OLSR. Unfortunately as networks have grown, this protocol has buckled, and sometimes broken, under the strain, as OLSR was never designed for the size or variety of the networks we have. This year we added a new modern network protocol - Babel (see the How-To in the online documentation for more information). The goal has been to replace OLSR after a period of testing and migration, and we imagined it might take years to successfully transition from one protocol to the other. Instead, we have been blown away by how our community has embraced and requested this change. As of this writing, almost 80% of nodes worldwide are running firmware which uses the Babel protocol.

With this in mind, we have decided to move more quickly with our Babel transition. 2025 will be the last year we release AREDN® code which contains OLSR; 2026 will be the year we only speak Babel.

The Plan

In 2025 we expect one or more additional AREDN® production releases. These will be maintenance releases containing only critical bug fixes. All new development work will happen in the Babel nightly builds. Then in 2026, the Babel nightly build will become the **main** nightly build, with the first production release being **4.26.1.0**. To mark this change, we will bump our major release number to 4, indicating this major protocol change.

Effects of this Plan

Advantages for Babel-only networks:

- Reduced firmware size / memory footprint / cpu utilization on individual nodes.
- Reduced network bandwidth utilized for maintaining routing information. Babel only transmits routing changes when they are detected, as compared to OLSR which broadcasts routing tables continuously.
- Resistance to forming routing loops.

Impacts to non-Babel networks:

- Nodes on non-Babel networks will continue to operate normally in communicating with each other. These "legacy" nodes will not stop operating, but they can continue to communicate with their peers on their existing firmware releases.
- non-Babel nodes will not be able to communicate with Babel-only nodes due to their inability to establish routes to those nodes.

Impact when navigating the Supernode network:

- Once supernodes are migrated to Babel-only firmware, they may not be able to route queries to non-Babel nodes.

Other Impacts

- Nodes with 32 MB of RAM can't run the Babel-only code (predominantly the 'XM' hardware); make plans on retiring or replacing them. At this point only about 4% of the nodes on the network are in this category. As adjacent nodes convert to Babel-only, these

legacy nodes will be unable to connect to the network.

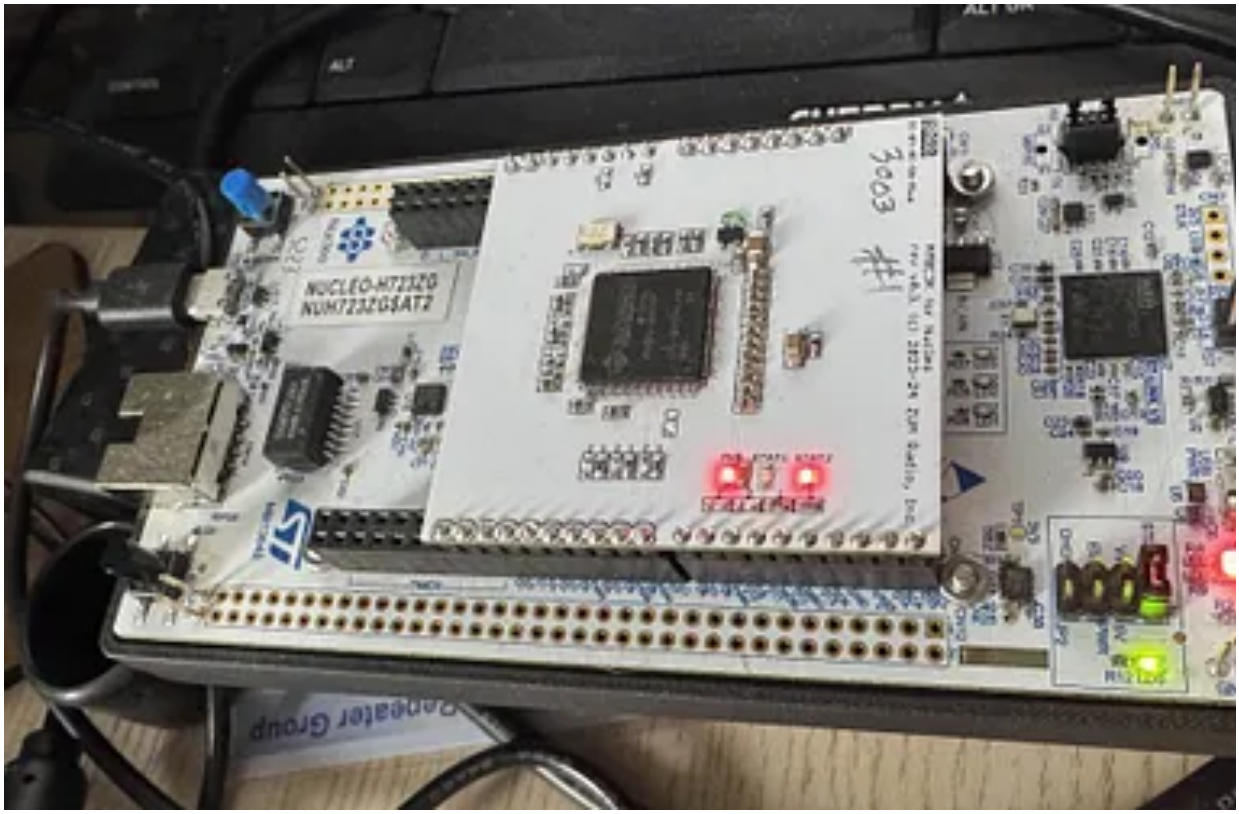
- And, as always, people will be free to download and install any legacy version of firmware they desire from the AREDN® download site.

I'm glad that AREDN decided to push forward their plan to phase out OLSR. Everything I've heard about the conversion to Babel has been positive, with no downsides other than compatibility with legacy nodes.

Technological innovation in Amateur Radio! I'm looking forward to some long chats with the AREDN folks at Pacificon 2025 in a few months.

MMDVM.com 2025-08 Update

> We are going to provide a monthly update to keep the community updated on our various projects. For this first update, we are going to cover work done over the last several months.
>
> **DVRef.com**
>
> Maintaining the hosts files for reflectors has been an ongoing challenge for MMDVM. Numerous requests come into the to add or update reflectors. Most of the work has been done by Jonathan G4KLX. Occasionally, these are submitted as Pull Requests which reduces that burden significantly.
>
> Through a team effort DVRef.com was created. This is a self-service portal that allows reflector operators to add, update, and delete reflectors on their own. They are now the source of record for host files used by MMDVM, Pi-Star, and WPSD. DVRef.com manages MREF, URF, DMR (none Brandmeister), NXDN, P25, and YSF reflectors.
>
> This service has reduced the burden on all three projects and given reflector operators better control over their reflectors. DVRef has added more fields to the tables to help users understand who is responsible for each reflector and how to get more information about the organization. This project has helped the community in a significant way.
>
> **MQTT**
>
> MQTT, or Message Queueing Telemetry Transport, is a system where services can publish information and subscribers can retrieve the information. Sources can post information to the server, or Broker, without concern for where the information is being consumed. Subscribers (one or more) can subscribe to the information and receive it as it becomes available.
>
> This makes it very easy for a process to post information asynchronously (meaning the process doesn't get blocked) and MQTT will deliver to another process, on the same computer or a different computer, or several different computers.
>
> Why is this important for MMDVM? Before MQTT the main loop in MMDVM was managing the displays directly. Meaning the loop would send information to the screen and wait for the screen to respond before continuing the loop. This could cause delays that were enough to affect audio (causing drop outs). Moving to MQTT for this moved the display code outside the main loop in MMDVM and allows it to be handled in a separate process, a process that could be blocked and not affect the processing of audio packets.
>
> MQTT also opens many other doors. For example, your display no longer needs to be attached to your hotspot. It could be a different device, a desktop computer or a mobile device. Consider taking advantage of this for a hilltop repeater, or a group of repeaters. You could create a central dashboard for all of your repeaters.
>
> MQTT was also implemented for logging, for all the same reasons as for the display. Just like for the display, you can subscribe to the logging topic and get the log stream delivered to your client. Again, think about hilltop repeaters.
>
> You should know this only allows you to retrieve these streams from the time you subscribe, there is no history available. But, you could create your own database and store both streams locally.
>
> Currently this work is in the "mqtt" branch of Master. We have not moved it into Master yet because it would break WPSD and Pi-Star. We will merge this into Master when the platforms are ready to use MQTT. In the mean time, you can build from the MQTT branch and run it locally. You can start work on your own displays and consoles
>
> **Transcoder**

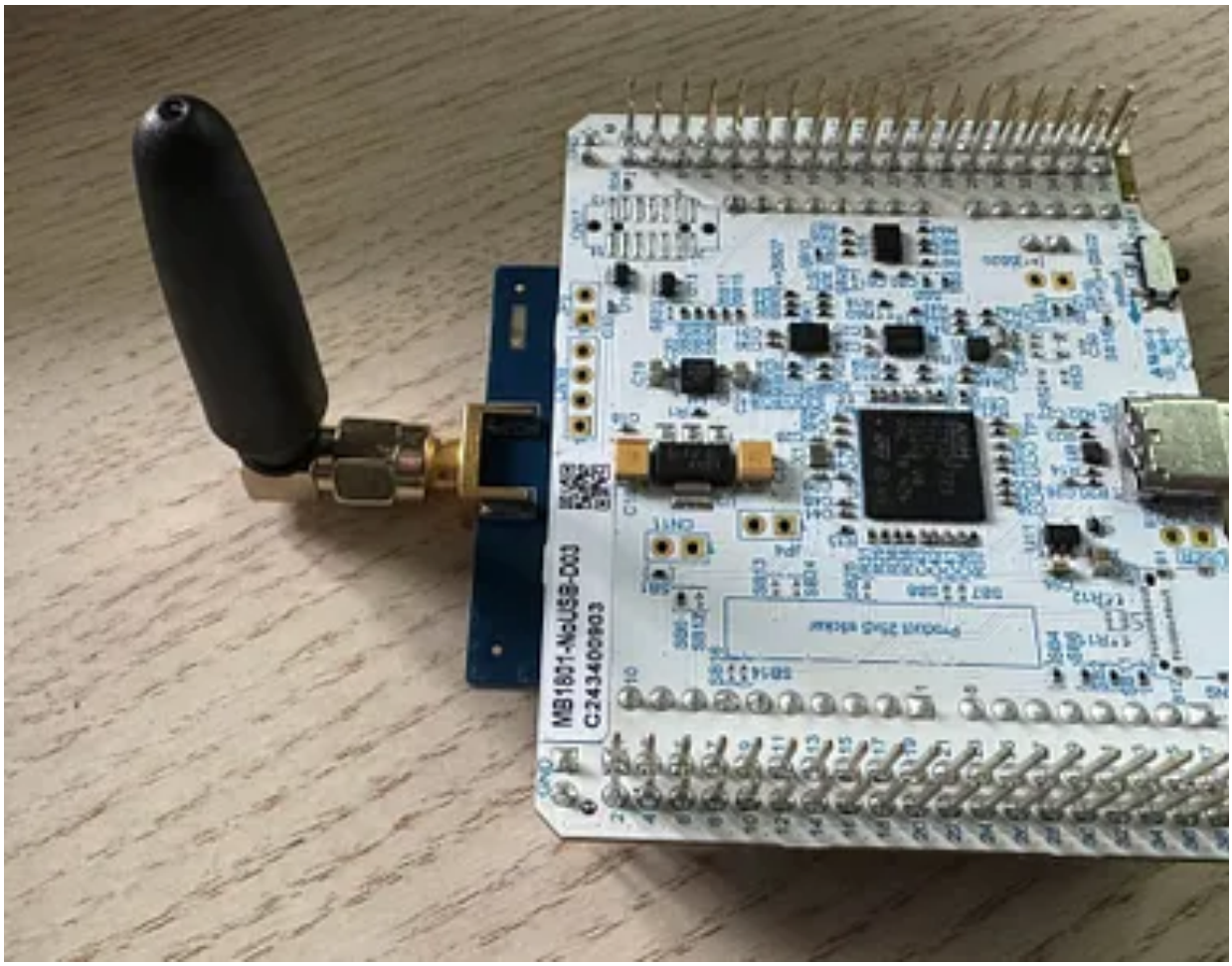


We haven't talked about this project very much, but it has great potential and it is functional at this point. We are working on a transcoder, an any mode to any mode transcoder. You will be able to connect this to the USB port on your hotspot and get anything from anything transcoding in real-time. We have this working now on prototype hardware graciously provided by ZUMRadio at no cost to the project. ZUMRadio is still finalizing the hardware, but the intended format is a thumb drive sized module that will plug into a standard hot spot. We plan to have this available for display and demonstration at Pacificon in October 2025.

The transcoder software will consist of an MCU and either one AMBE 3003 or two AMBE 3000 modules. We are looking at this hardware for cross-mode operations, for example D-STAR to P25. The firmware can be found in the MMDVM-Transcoder repository. The other component of this project is the cross-mode software. This sits between MMDVMHost and the gateways. When in cross-mode, MMDVMHost sets up the cross-mode software for the input mode and output mode and starts sending packets. The cross-mode software uses the transcoder as needed to convert packets from one mode to the other. The software for the cross-mode software can be found in the MMDVM-CrossMode repository.

You won't see this software on your hotspot until it is supported by WPSD and Pi-Star. As you can imagine, the configuration page will be fairly complicated.

ST Micro WL33



> Most of the hotspots on the market use the ADF7021 chip to generate RF. It has been a great chip, but Analog Devices has marked it for end-of-life. In conjunction with ZUMRadio we started looking at the STMicro WL33. This is an STM32 processor with RF generation capabilities built in. It sounds like a perfect match for a hotspot and a great replacement for the ADF7021.
>
> **Our Supporters**
>
> - ARDC – Provides the grant that makes this work possible
> - ZUMRadio – Ongoingly provides prototype and production hardware at no cost
> - Martin Alcock VE6VH – A contributing developer that made significant progress on the WL33 project
>
> You can be a supporter as well. Go visit our Open Collective page, there you can make monthly or one-time donations. While ARDC has been our primary supporter, every dollar helps to make MMDVM better. Your support dollars are important.

Whew! I'd been given some early info about the Transcoder and the pending change to the STMicro WL33 while demonstrating IP400 at Hamvention 2025 at the ZUMRadio / MMDVM booth… but I couldn't talk about it. Now this info is public. (Thanks again Jim Mclaughlin KI6ZUM for your generosity!)

Technological innovation in Amateur Radio! I'm looking forward to some long chats with the *MMDVM* folks at Pacificon 2025 in a few months.

Does Amateur Radio Need a DEFCON?

Dan Romanchik KB6NU on his blog:

> Last week, I taught my fourth one-day Tech class at DEFCON. DEFCON, as some of you may know, is one of the premiere hacker/cybersecurity conferences.
>
> This year, I had 32 students in the class, and 30 passed the test that day, while the remaining two passed the next day after a little more study. 100% Yay!! The purpose of this post is, however, not to brag about my teaching prowess (well, okay, it is at least a little). Instead, I'm going to describe how DEFCON is organized and explore how we might adopt and adapt this model to amateur radio. And, in doing so, I'm going to compare and contrast DEFCON with the Dayton Hamvention.
>
> The first comparison I'll make is the number of attendees. Both events claim attendance somewhat north of 30,000. Hamvention is claiming an all-time high attendance of 36,814!

> The second comparison I'll make is the cost of admission. Hamvention costs between $25 and $30 to attend. DEFCON, on the other hand, cost $500 this year!
>
> How does DEFCON get away with this? Well, first of all, DEFCON is more akin to a professional conference than a hobby gathering. While there are talks and activities that one would consider to be "hobby-oriented"—such as the Tech class I taught and the hidden transmitter hunts put on by the Ham Radio Village—the majority are geared towards the professional hacker and cybersecurity community. Overall, there were hundreds of talks and activities, wayyyyy more than you find at Dayton.
>
> One of the reasons they are able to do this is they hold DEFCON at the Las Vegas Convention Center (LVCC), not a county fairground. I don't mean to criticize the Dayton Amateur Radio Association or the Greene County Expo Center, but just to compare the two venues. The LVCC is set up to handle the kind of event that DEFCON is. The Greene County Expo Center just doesn't have the facilities to host more than four talks at a time.
>
> The other interesting thing about DEFCON is its organization around "villages." These villages are special-interest groups that focus on a particular activity. I already mentioned the Ham Radio Village (HRV). I haven't counted how many other villages there were at DEFCON this year, but I'd say that there were at least a couple dozen. These included groups such as the Red Team and Blue Team villages, the Aerospace Village, the Automotive Village, the Social Engineering Village, the Biohacking Village, and many more.
>
> Each of these villages are given the space to conduct their activities, which usually includes talks about the village's subject matter. For example, the Ham Radio Village had talks about Meshtastic, AREDN, and how amateur radio might play a part in resisting a fascist government. To help ensure that the village had enough people to conduct all these activities, the DEFCON organizers give each village a number of free admissions to pass on to volunteers.
>
> **A DEFCON for ham radio**
>
> DEFCON is an incredibly cool experience. I've really only touched on a small part of it. Think how cool it would be if we had something similar for ham radio. Our villages could include a Digital Communications Village, some kind of Hardware Hacking Village (was there even a soldering skills workshop at Dayton this year?), a Software Hacking Village, an Antenna Hacking Village, and because I enjoy CW, a CW Village.
>
> One thing that comes to mind—and this is just a partly-baked idea—is expanding the scope of QRP-ARCI's Four Days in May. That might be asking too much of QRP-ARCI, though. Perhaps we could get groups like LICW or CWops to ramp up their activities at Dayton to form the CW Village.
>
> One might think that the ARRL would be the perfect group to organize such an event. Unfortunately, they're too busy alienating their members and playing silly political games to even consider doing such a thing. Instead of coming up with some original ideas of their own, I heard that they tried to take over Hamvention from DARA. That would have been a real disaster. Kudos to DARA for resisting that effort.
>
> At any rate, I'd love to figure out how to do this. If you have any thoughts and would like to discuss this further, comment below or contact me directly.

Short answer to KB6NU's question? Yes, Amateur Radio needs a conference more like DEFCON.

I posit that a week long conference focused on Software Defined Radio - GNU Radio Conference 2025 is a pretty good equivalent to DEF CON's focus on cybersecurity.

I have limited experience with the various larger Amateur Radio conferences (never been to Hamcation, Huntsville Hamfest, NEAR-FEST) but in my experience, Pacificon is a "good start" for a DEF CON type conference. It's held in the same hotel as attendees, it's three days, there seems to be a higher degree of Zero Retries Interesting presentations, etc.

Of course, Tina KD7WSF and I are doing our part with ZRDC 2025, and very likely ZRDC 2026.

Open Letter from AMSAT-SM Regarding Development of a Full Duplex Handheld

> **Open Letter from the AMSAT-SM Group in Sweden to Amateur Radio Manufacturers Regarding the Development of a Full Duplex Handheld Amateur Radio**
>
> Dear Sir or Madam,
>
> In recent years, we have seen the release of many new handheld amateur radios from both established manufacturers such as Icom, Kenwood, and Yaesu, as well as from newer, smaller manufacturers, often based in China. These radios frequently include advanced features such as VHF/UHF FM operation, APRS, TNC, USB-C charging, GPS, Bluetooth, and more.
>
> However, one key capability is consistently missing: **true full duplex operation** – the ability to transmit on one band while simultaneously receiving on another, without desense. For example, transmitting on VHF while receiving on UHF, or vice versa.
>
> We at AMSAT-SM believe there is a significant and growing market for such a radio among amateur radio operators worldwide. A particularly important group consists of operators who use amateur radio satellites, for whom full duplex operation greatly enhances communication and usability. These operators are also prepared to pay a premium for a handheld with this functionality. At present, no current handheld model offers full duplex capability. Instead, many satellite operators rely on discontinued radios such as the Kenwood TH-D72.
>
> We therefore respectfully request the development of a new handheld amateur radio with true full duplex capability between VHF and UHF (e.g., transmit on 145 MHz and receive on 435 MHz without desense, and vice versa).

This… is a good approach. This has been mentioned as a "nice to have" for the LinHT currently in development, but currently it only has a 70cm (420-450 MHz) radio. But I can certainly see the utility for Amateur Radio satellite operations, and much more.

AllStarLink Appeal For Donations

AllStarLink is a network of Amateur Radio repeaters, remote base stations and hot spots accessible to each other via Voice over Internet Protocol. AllStarLink runs on a dedicated computer (including the Raspberry Pi) that you host at your home, radio site or computer center. It is based on the open source Asterisk PBX running our app_rpt application. App_rpt makes Asterisk a powerful system capable of controlling one or more radios. It provides linking of these radio "nodes" to other systems of similar construction anywhere in the world via VoIP.

AllStarLink's primary use is as a dedicated computer node wired to your repeater or radio. Connections from Echolink, other VoIP clients and telephone calls are supported.

AllStarLink has **40,314** users and **42,186** nodes.

From the AllStarLink Board of Directors
August 17, 2025

On behalf of the Board of Directors, we would like to graciously thank all the volunteers and donors; especially those who have set up recurring donations. Without them, none of this would be possible.

The unpaid AllStarLink Board of Directors and volunteers have been busy overseeing the daily operations of the AllStarLink network. It is worth noting, AllStarLink network availability is over 99.99%.

Over the last four years, AllStarLink has seen phenomenal growth. Four years ago, approximately 2,000 nodes were logged into our servers at any one time. We are now seeing more than 10,000 nodes. This growth has brought increased expenses and we are currently running at an operational deficit. We could really use your help.

If you find value in the AllStarLink service, we are asking for a voluntary donation of $12/yr per node to help us maintain and improve the AllStarLink eco-system. For those wishing to support our ongoing efforts please see our 501(c)3 donations page at AllStarLink | Donate

As you may have heard, we have some exciting news. With a generous grant from the ARDC, last year, we released ASL 3. It is the first new client in 15 years for AllStarLink. ASL 3 has been redesigned to run on Asterisk 22 LTS with the latest version of Debian 12 Linux and modern hardware. This is a significant update from the current clients running Asterisk Version 1.4. The new version incorporates over 15 years of Asterisk bug fixes, major security improvements, and enhancements. The update required “app_rpt”, the Asterisk application that is Allstar, to be heavily modified. Many memory leaks have been addressed, modules now load or refresh more reliably, and many bugs have been squashed. All of this adds up to improved stability and uptime. We recommend that all users of AllStarLink upgrade their appliances, PC’s and Raspberry Pi’s to use the latest version of ASL 3.

Over 3,700 nodes have already upgraded and are currently using ASL 3. This includes nodes using Raspberry Pi’s 3, 4’s or 5’s (many that had been running Hamvoip), x86_64/AMD PCs and cloud nodes, Kits4Hams SHARI boxes, Node-Ventures ClearNodes, Repeater Builder, and Hotspot Radios.

To learn more, visit the ASL3 Manual or log into the AllStarLink Community. You can also view how-to videos here. If you are using a hotspot appliance, we recommend contacting the hardware manufacturer for specific upgrade instructions.

We are also looking for volunteers; especially developers with PHP/Laravel and JavaScript experience. If you have these skill sets and are willing to help, please reach out to us at volunteer@allstarlink.net.

We thank you in advance,

Pete Elke /WI6H - President
Todd Lesser /KM6RPT – Secretary
David Shaw /WB6WTM - Treasurer
Kevin Custer /W3KKC - Board Member

Help Support ASL

The implementation of this system and its monthly upkeep is very costly. Any monetary help that you can and wish to give will be much appreciated. Allstarlink Inc. is a 501(c)(3) non-profit organization.

Of the various repeater linking systems I hear / read about, I hear the most good things, both technical and operational, about AllStarLink.

Leave a comment

Share

Comments Summary From Previous Issue

Comments from Zero Retries 0215

- Enthusiasm for LinHT.
- Feedback on repeater coordination issues.
- Memories of Packet Radio in the DARPA era.
- Does FT8 function similarly to ka9q-radio?

To receive new issues of Zero Retries every week via email, become a free subscriber. To support Zero Retries, paid subscriptions are appreciated, *but entirely optional*.

Subscribe

Zero Retries Boilerplate

The **Zero Retries Store** is now open for business with quality Zero Retries branded merchandise and items being retired from Steve's N8GNJ Labs.

These bits were handcrafted (by a mere human, not an Artificial Intelligence bot) in beautiful Bellingham (The City of Subdued Excitement), Washington, USA, and linked to the Internet via **Starlink *Satellite* Internet Access**.

See the **Zero Retries Boilerplate** page for significant acknowledgements and other information relevant to Zero Retries. For new readers of Zero Retries, that page, and the **About Zero Retries** page has useful information to check out.

My ongoing ***Thanks*** to:
Tina Stroh KD7WSF for, well, *everything!*
Jack Stroh, Late Night Assistant Editor Emeritus
Shreky Stroh, Late Night Assistant Editor In training

Annual Founding Members **who generously support Zero Retries financially:**
Founding Member 0000 - Steven Davidson K3FZT (Renewed 2025, *3rd year!*)
Founding Member 0001 - Randy Smith WU2S (Renewed 2024, *2nd year!*)
Founding Member 0002 - Chris Osburn KD7DVD (Renewed 2025, *3rd year!*)
Founding Member 0003 - Don Rotolo N2IRZ (Renewed 2025, *3rd year!*)
Founding Member 0004 - William Arcand W1WRA (Renewed 2025, *3rd year!*)
Founding Member 0005 - Ben Kuhn KU0HN (Renewed 2024, *2nd year!*)
Founding Member 0006 - Todd Willey KQ4FID (Renewed 2024, *2nd year!*)
Founding Member 0007 - Merik Karman VK1DF / VK2MKZ (Renewed 2025, *3rd year!*)
Founding Member 0008 - Prefers to Remain Anonymous 14 (Renewed 2024, *2nd year!*)
Founding Member 0009 - Prefers to Remain Anonymous 19 (Renewed 2025, *2nd year!*)
Founding Member 0011 - Rick Prelinger W6XBE (Renewed 2025, *2nd year!*)
Founding Member 0012 - Ryan Tolboom N2BP (New 2024)
Founding Member 0013 - Newton White N4EWT (New 2025)
Founding Member 0014 - Joe Hamelin W7COM (New 2025)
Founding Member 0015 - Rich Stocking N7OP (New 2025)
Founding Member 0016 - Prefers to Remain Anonymous 77 (New 2025)
Founding Member 0017 - Phil Karn KA9Q (New 2025)
Founding Member 0018 - Prefers to Remain Anonymous 95 (New 2025)

Numerous Annual and Monthly subscribers who also generously support Zero Retries financially!

You thousands of readers of Zero Retries without which there would be little point in publishing this newsletter.

Permission for Reuse of Zero Retries Content

Blanket permission is granted for *Amateur Radio use* of any Steve Stroh content in Zero Retries for Amateur Radio newsletters and distribution via Amateur Radio such as (but not limited to) Packet Radio Networks, Packet Radio Bulletin Board Systems, Repeater Nets, etc. Specific blanket permission is granted to TAPR to use any Steve Stroh content in Zero Retries for the TAPR Packet Status Register (PSR) newsletter (I owe them from way back).

In such usage, please provide appropriate authorship credit for the content (especially for guest authors) and mention that it was first published in Zero Retries newsletter, preferably in this format:

This article is reprinted with permission. It was first published in Zero Retries newsletter, issue Zero Retries (number), (date) - (include full web link of the specific issue).

It's appreciated (a courtesy, *but not required*) to notify Zero Retries Editor Steve Stroh N8GNJ of any reuse of Zero Retries content - stevestroh@gmail.com

If you'd like to republish an article in this issue for other uses, just ask.

All excerpts from other authors or organizations, including images, are intended to be fair use. *Unless otherwise noted in the article*, there are no paid promotional items in any Zero Retries articles.

Portions Copyright © 2021, 2022, 2023, 2024, 2025 by Steven K. Stroh.

This issue released on 2025-08-22

Keywords for this Issue

Zero Retries 0216 dated 2025-08-22

Amateur Radio, amprv6.org, AllStarLink, AMSAT-SM, ARDC, AREDN, Babel, **Data Communications**, DEF CON, DEFCON, **Digital Communications**, **Digital Voice**, **DV**, **Ham Radio**, IPv6, JNOS 2.0q, K3XEC, KV4P, LinHT, MMDVM, **N8GNJ**, **Packet Radio**, PACKRAT, patty, **Radio Technology**, **Software Defined Radio**, **Software Defined Receiver**, SF-HAB, **Steve Stroh, Zero Retries, Zero Retries Digital Conference, ZRDC 2025**

*Keywords in **Bold** are regular mentions in each issue.*

Footnotes for this Issue

To see the relevant sentence for the footnote, just click the footnote number.

1

I've been trying to explain the opportunity to several vendors that seemed willing to listen, but I haven't perceived any significant interest.

2

Of course, small Software Defined Transceivers, for use with laptops, etc. already exist, but I think that the LinHT hardware standard will quickly become so ubiquitous that keeping the same processors, etc. in a variety of form factors will be advantageous.